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United States Department of Agriculture,

DIVISION OF BOTANY.

CRIMSON CLOVER SEED.

The use of crimson clover (*Trifolium incarnatum*) has increased to such an extent that it is now a standard crop in many parts of the Southern and Middle States. It is distinguished by its long head of brilliant scarlet blossoms and by the great depth to which its roots make their way. Wherever the winters are not too severe it thrives and is a valuable plant for soiling or for hay. It is a winter annual, the seed being sown any time from the middle of July to late fall in the Southern States. It grows throughout the milder weather in winter and quickly makes a dense cover to the ground in spring. This can be pastured, cut for hay, or turned under for green manure, or all three, depending upon conditions.

THE SEED.

The seed of crimson clover is larger than that of red or mammoth clover and is almost perfectly oval in shape. The fresh seed is of a bright reddish yellow color and has a high polish. As the seed becomes older the color changes to a reddish brown, and eventually the polish is lost and the seed has a dull, dark reddish brown color. Such seed should never be purchased, as it is too old to grow well.

In general the seed of crimson clover is less liable to contain many weed seeds than the seed of other clovers. It is harvested before most of the weeds have matured their seed, and being planted in late summer or fall it tends to choke out what weeds may come up with the young plants. In some cases, however, it contains the seeds of serious weeds and farmers should be on their guard when purchasing. In a number of tests made at this laboratory the seeds of fifty weeds were found to be more or less frequently present. Most of these occurred but seldom and then only a few seeds in a sample, but sorrel, yellow trefoil, and mustard were found in 72 per cent of the samples. In the worst samples there were from 3,000 to 6,300 weed seeds per pound, while in one case there were 38,958 seeds of yellow trefoil per pound. The seeds of a species of geranium are not infrequently present. These are of about the size and shape of crimson clover seeds but lack polish and are marked with fine pits, which are at once evident when the seed is examined with a low-power hand lens.

The most serious adulteration of crimson clover seed is that of Egyptian clover (*Trifolium alexandrinum*). It is stated that this is not uncommon in European seed, but so far we have not observed it in American samples. The seeds of Egyptian clover are of the same size and color, but the form tends more to egg-shape. There are deeper lines on the edge where the rootlet can be seen outlined on the seed. In crimson clover this edge is about as smooth as the back, but in Egyptian clover there is a marked depression on each side of the rootlet.

The worst weed that can possibly get into a clover field is dodder. The seeds being small are seldom found in crimson clover seed, but they may be present in poorly cleaned samples and a lookout should always be kept for them. The seeds of dodder are small and gray and look like minute lumps of clay.

GERMINATION.

While crimson clover seed is comparatively pure its germination often leaves much to be desired. This seed deteriorates rapidly with age and fresh seed should always be demanded; nor should an assurance of its being fresh be sufficient, but a guarantee of a definite percentage of purity and germination should be demanded from dealers. Seedsmen always disclaim any warranty and as a rule they oppose a guarantee, but there is no reason why clover seed of all

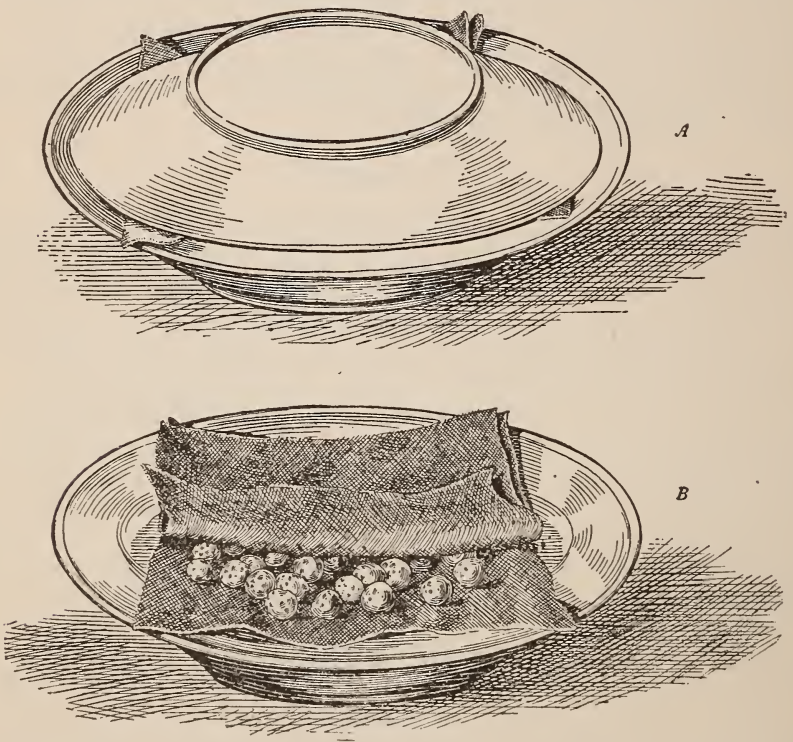


FIG. 1.—Simple germinating apparatus: *A*, closed; *B*, open.

kinds should not be guaranteed. The purity can be accurately determined and a simple germination test is all that is needed to determine the vitality of a given sample. Dealers can readily make their own germination tests, as many do now, and there is no excuse for the carelessness of some who sell seeds as they would nails, without the least knowledge of their quality.

Consumers should not only insist on a guarantee, but should test the germination of their seed whether guaranteed or not. This can easily be done at home by any one. The accompanying illustration (fig. 1) shows a simple homemade germinator. A piece of moist cloth (flannel is best) is laid on a plate, the seeds placed between the folds of the cloth and a second plate inverted over the whole. A certain

number of seeds, 100 or 200, should be carefully counted out, and the germinating ones removed and counted as fast as they appear. Germination will begin on the second day and good seed ought to sprout 80 to 90 per cent in three days.

The importance of the germination test can not be too strongly urged. If preferred it may be made in soil. In some respects this is a better test, showing not only how many seeds will produce sprouts, but also how many will produce plants. The vigor of the plants can also be noted. The soil test, however, requires more time and is less convenient than the cloth test, and the latter will show the value of the seed if note is taken of the number that sprout after the third day and of those that make weak sprouts. Even though the percentage of germination during a ten-day test comes up to 80 or 90 per cent, if germination is slow and the sprouts weak the seed will not give satisfaction. Crimson clover seed germinates rapidly, and in most cases one or two days will be enough to determine whether the seed is fit for use.

Many of the failures with crimson clover are due to use of old seed, which is sold at a low price. This is discolored and will show poorer germination than fresh seed and produce weaker plants. Even fresh seed may, however, be of poor quality. The seed of crimson clover is not easy to harvest. The plants require to be cut when the seed is hard and ripe but not yet loosened from the plant. If wet weather follows cutting or if the seed is not properly dried it becomes discolored and may begin to sprout. If it is then dried and germination is checked the vitality of the seed may be seriously injured. It is, therefore, never enough to say that a given sample is fresh, but the consumer should insist upon a gurantee and upon seed that will test 85 to 95 per cent. Two-thirds of the samples tested at this laboratory have germinated more than 90 per cent.

AMOUNT OF SEED TO USE PER ACRE.

The amount of seed per acre varies under different conditions. From 12 to 25 pounds has been recommended, but in most cases 15 to 20 pounds is about the quantity required. The amount needed will, of course, depend upon the quality; a sample that will give 90 per cent of strong sprouts will go further than one germinating less than 50 per cent. Seed in the husk is sometimes used and with good results in dry weather. When this is used more seed is needed, say a bushel per acre.

THE GUARANTEE.

The seedsman cannot guarantee a crop. This depends on so many uncontrollable conditions that no seed however good can always produce a crop, but the dealer can guarantee the quality of the seed, and upon this consumers have a right to insist. This guarantee might be made good for three to six months to protect the seedsman against deterioration of the seed by age after it leaves his hands.

In case of dispute the State station or U. S. Department of Agriculture should be asked to test the seed, and this report should be accepted by both parties. A guarantee will enable the farmer to judge whether the price is fair. He can compare the price with the guaranteed value and purchase accordingly.

In making a guarantee the seedsman should agree that in case the seed sold does not come up to the guarantee he will either replace it with a fresh sample, paying freight charges, or that he will refund a pro rata amount of the money paid for the seed, as the purchaser shall elect. The real value of a sample of seed is determined by multiplying the percentage of purity by the percentage of germination and dividing by 100. For example, if a sample is 98 per cent pure and shows a germination of 90 per cent, its real value is $\frac{98 \times 90}{100} = 88.2$ per cent. Again, if the purity is 98 per cent but the germination only 50 per cent, the real value will be 49 per cent. Expressing this in terms of pounds per bushel we have in the first case 52.92 pounds of pure and germinable seed in every bushel of 60 pounds and in the second case 29.4 pounds. If the seed was guaranteed to have a purity of 98 per cent and a germination of 90 per cent and the germination fell to 80 per cent on test, the amount of rebate would be 9.8 per cent of the purchase price.

The principal use of the guarantee is not the return of a small amount of money but the assurance to the farmer that the seed he buys is good and that his time and labor will not be wasted.

SENDING SAMPLES TO THE DEPARTMENT OF AGRICULTURE.

The Seed Laboratory is making a special study of grass and forage plant seeds, and any sample sent in will be promptly tested and reported on. Farmers will find it to their advantage to send samples for test, giving name of firm from whom purchased, price paid, and the guarantee, if any.

The sentiment against the sale of poor seed is growing, and it is to the interest of all concerned that fraudulent practices should be stopped or the perpetrators exposed when found. If the Department can secure abundant samples of the crimson clover sold this season, especially in the South, it is possible that some advance may be made toward better seed. The guarantee, however, furnishes the key to the situation. If consumers will buy from responsible seedsmen and before purchasing insist upon a guarantee, there will be little possibility of trouble. The purchase of cheap seed, on the other hand, is frequently the reason why no stand is secured, or why the plants are too weak to winter over.

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Approved:
J. H. BRIGHAM,
Acting Secretary of Agriculture.

WASHINGTON, D. C., *August 5, 1899.*

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